



D O N N E R SCIENTIFIC COMPANY
PRECISION INSTRUMENTATION

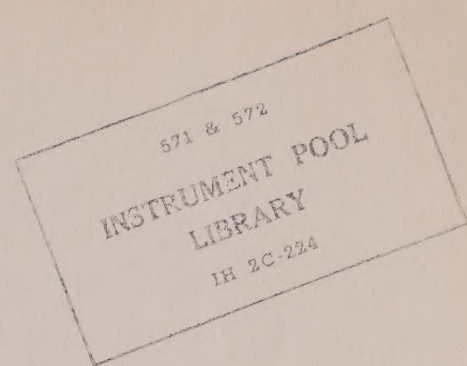
Operating Handbook

Model 10

Laboratory Oscillator

2829 SEVENTH STREET
BERKELEY 10, CALIFORNIA
BERKELEY 7-3150





Operating Handbook

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Laboratory Oscillator

Serial Number

98

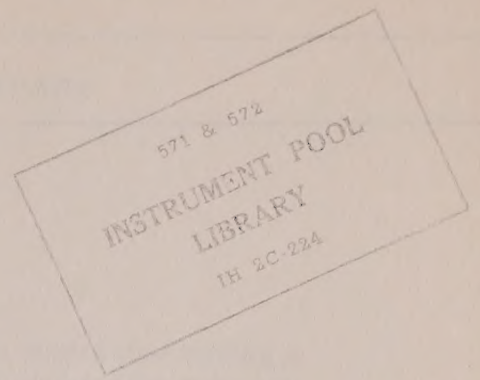


Table of Contents

Subject	Page
Warranty	i
Receiving Inspection	i
Repairs	i
General Description	1
Specifications	1
Theory of Operation	2
Output Circuit	3
Power Supply	3
Installation	5
Operation	5
Maintenance	5
Adjustment and Calibration	6

Illustrations

Figure

1. Conventional Wien Bridge Oscillator Circuit	2
2. Oscillator Block Diagram	3
3. Layout of Instrument Panel	4
4. Schematic	7

DONNER SCIENTIFIC COMPANY

WARRANTY

Donner Scientific Company instruments are warranted during a period of one year from date of shipment to original purchaser to be free from defects of material and workmanship. This warranty does not apply to vacuum tubes except as they are warranted by tube manufacturers. The liability of Seller under this warranty is limited to replacing or repairing any instrument or component thereof which is returned by Buyer at his expense during such period and which has not been subjected to misuse, neglect, improper installations, repair, alteration, or accident. Seller shall have the right of final determination as to the existence and cause of a defect. In no event shall Seller be liable for collateral or consequential damages. This warranty is in lieu of any other warranty, express, implied or statutory, and no agreement extending it will be binding upon seller unless in writing and signed by a duly authorized officer or representative.

RECEIVING INSPECTION

Every Donner instrument is carefully inspected and in perfect working order at the time of shipment. Each instrument should be checked as soon as received! If the unit is visibly damaged in any way or fails to operate, a claim should be filed immediately with the transportation company.

REPAIRS

Wherever a Donner instrument requires service, the nearest Donner representative should be contacted; all representatives will provide for immediate service or arrange factory returns when necessary.

Please specify model and serial number in all correspondence concerning Donner instruments. Address all inquiries on operation, special modification, or applications of Donner instruments to your nearest sales representative, or Sales Manager, Donner Scientific Company, 2829 7th Street, Berkeley 10, California.

GENERAL DESCRIPTION

The Donner Model 10 Laboratory Oscillator is a versatile instrument for generating low distortion sine waves. It combines high voltage output and wide range of frequency in a single compact instrument suitable for general laboratory and test applications.

SPECIFICATIONS

Frequency range: 2 cps to 2 mcs in six decade ranges with approximately 10% overlap:

- | | |
|------------------------|------------------------|
| (1) 2 cps to 20 cps | (4) 2.0 kcs to 20 kcs |
| (2) 20 cps to 200 cps | (5) 20 kcs to 200 kcs |
| (3) 200 cps to 2.0 kcs | (6) 200 kcs to 2.0 mcs |

Frequency Response: Constant voltage output ± 1 db at any amplitude setting over the frequency range to 1 MC.

Output: 20 volts R.M.S. at the end of a four foot length of RG 62/U coaxial cable. A pentode video output amplifier is utilized so that neither reactive nor resistive loading will cause distortion of the output waveform.

Output Impedance: 2500 ohms shunted by 85 mmf.

Distortion: Less than 1% at full output over most of the frequency range.

Frequency Stability: Drift less than 2% including warmup over most of the frequency range. No zero setting required. Frequency change less than 1% below 1 megacycle with line voltage variation from 100 to 130 volts.

Hum Voltage: Less than 0.05% of rated output.

Power Requirements: 100-130 volts, 60 cps, 45 watts.

Dimensions: 7-3/8" by 10-3/8" by 8-1/8".

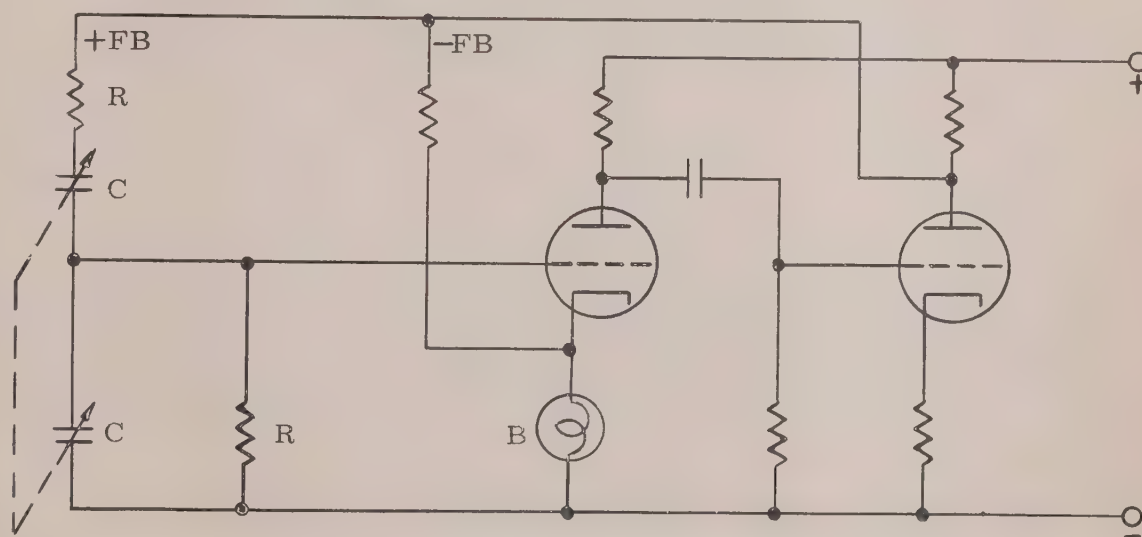
Weight: Approximately 15.5 pounds.

THEORY OF OPERATION

Oscillating Circuit: The Donner Laboratory Oscillator employs a conventional RC oscillator circuit as shown in Figure 1. It consists basically of a two stage amplifier with both positive and negative feedback. The positive feedback loop (+ FB), including the frequency-selective Wien bridge network, causes the circuit to oscillate. The expression for oscillation frequency, $f_o = \frac{1}{2 RC}$, shows that for fixed value of R the frequency varies

by the same ratio as the tuning capacitor C. To provide convenient overlap between decade ranges a 12:1 range of tuning capacitance is used. Individual ranges are selected by switching pairs of resistances R.

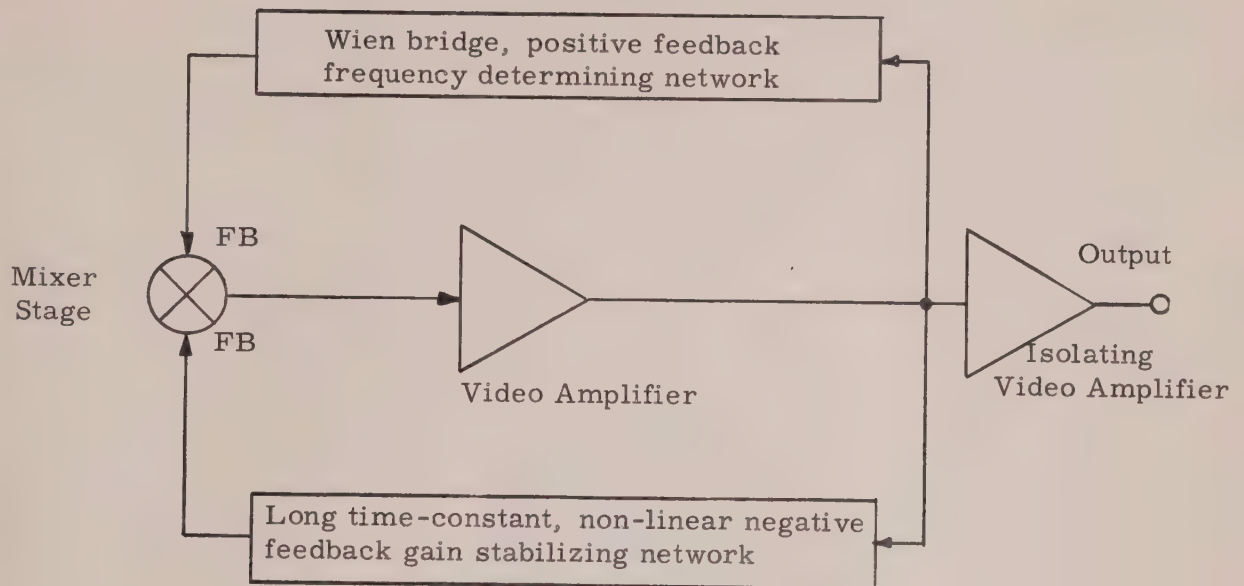
Figure 1



Conventional Wien Bridge Oscillator Circuit

A ballast lamp (B) in the negative feedback loop (-FB) provides a non-linearity with a relatively long time constant which adjusts automatically to compensate for output amplitude variations. As a result, constant and stable output is provided at minimum distortion over the entire frequency range. Figure 2 is a functional block diagram of the oscillator.

Figure 2



Oscillator Block Diagram

OUTPUT CIRCUIT

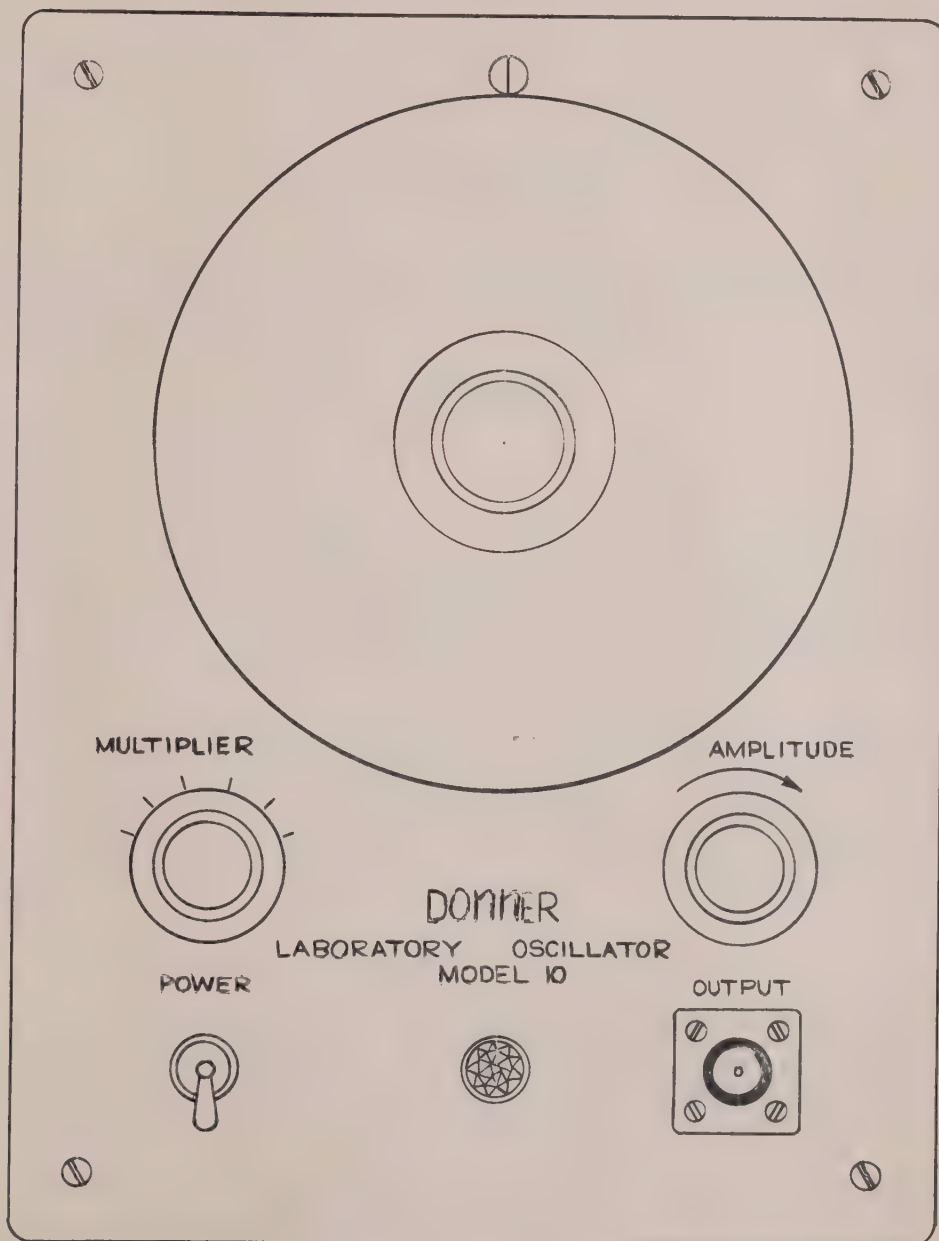
A wide range video amplifier is utilized to isolate the oscillating circuit from the load, so that its characteristics remain constant under all load conditions. In this way the high frequency limitation of transformers and the distortion of high frequency cathode followers with reactive loads are avoided.

POWER SUPPLY

Since transconductance, and hence phase-shift, of a vacuum tube amplifier changes with supply voltage, a voltage regulated power supply is used to insure good frequency stability even with line voltage variation.

The Donner Laboratory Oscillator employs a ferro-resonant magnetic amplifier to regulate the oscillator supply voltage. This means of regulation simplifies maintenance and increases long-term dependability, since it employs no vacuum tubes. A series resonating capacitor raises the primary current through the transformer, saturating the core. The flat-topped flux wave thus produced induces a flat-topped voltage in the secondary. The amplitude

Figure 3



Layout of Instrument Panel

of clipping remains constant as determined by the B-H curve of the transformer iron.

This magnetic voltage regulator operates over the range from 100-135 AC line volts.

INSTALLATION

No special installation instructions are necessary for the Model 10. However, for optimum ventilation, a clearance of several inches on top and sides should be left between the oscillator and adjacent equipment.

OPERATION

Consult Figure 3 for identification of controls.

Turn power switch on. Lighting of the pilot lamp will indicate that the unit is receiving power. Select desired frequency range by turning MULTIPLIER switch to proper point. At each range switch position, continuous tuning is provided over more than a 310° arc of the main tuning dial. Dial calibrations are applicable to all ranges by using the appropriate multiplier factors.

Output voltage level is increased continuously from zero to maximum value by clockwise rotation of the AMPLITUDE control knob. A potentiometer with linear taper is used, so that output voltage increases in proportion to rotation toward a maximum level of approximately 20 volts. Absolute output voltage level may be set with the assistance of an AC vacuum tube voltmeter or an oscilloscope.

MAINTENANCE

In order to remove the instrument from its case for servicing, lay the instrument on its face, and remove the four 8-32 screws holding the back panel in place. Remove the back panel, then slide the wrap-around off the instrument to the rear. Tubes and wiring will now be completely accessible.

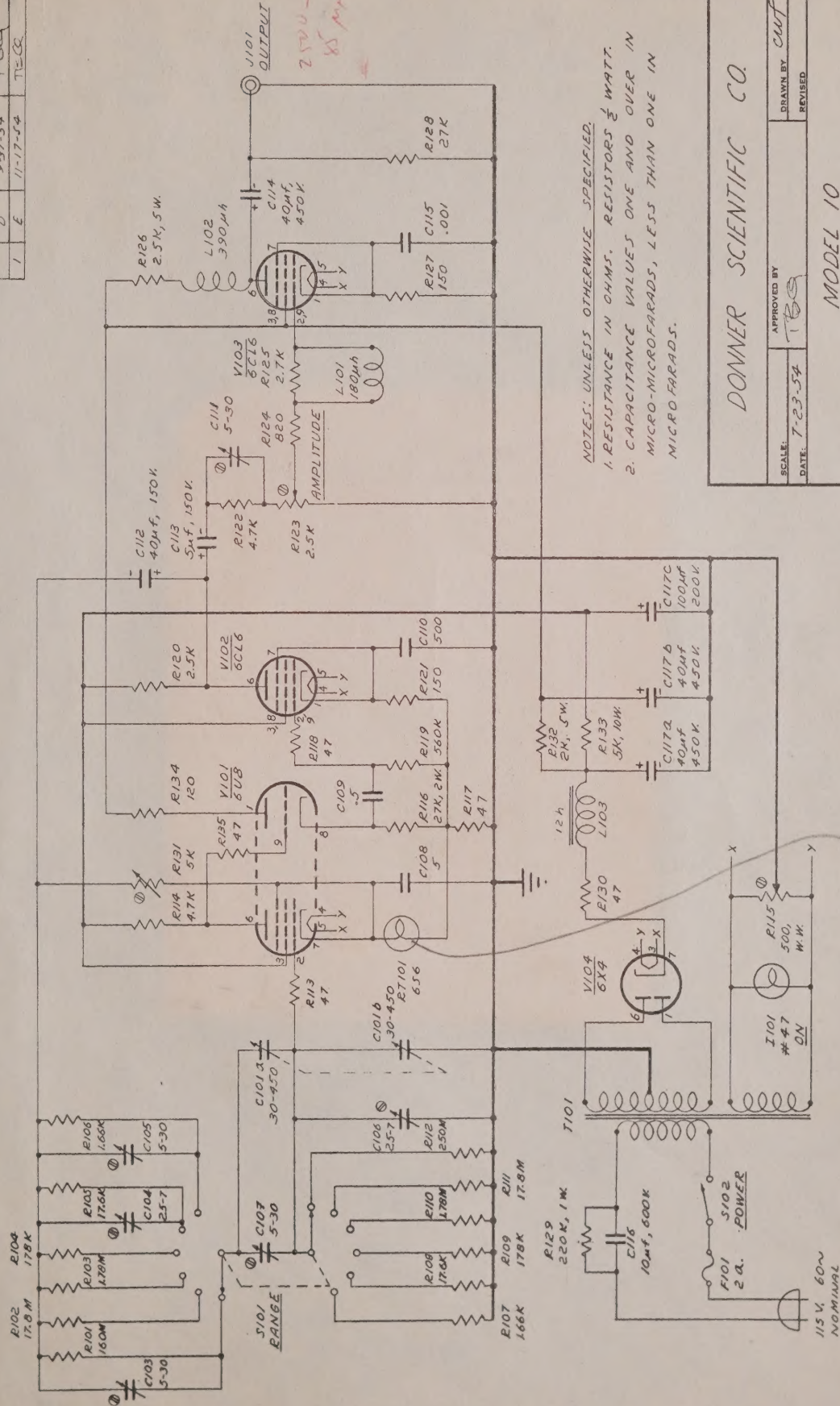
After replacing tubes, calibration and adjustment should be checked with wrap-around in place before replacing the back panel.

Except for renewal of the fuse, pilot light, or tubes, servicing should be referred to the nearest Donner Scientific Company representative.

ADJUSTMENT AND CALIBRATION

1. Set amplitude potentiometer (R 138) to maximum.
2. Set tuning dial to 20 and range switch to X 10.
3. Adjust R131 for 22 volts RMS out.
4. Set tuning dial to 200 and adjust C107 for 22 volts.
5. Adjust C106 for frequency calibration at 200 CPS.
6. Set range switch to X.1 and adjust C103 for frequency calibration at 20 CPS.
7. Set range switch to X 1K and adjust C104 for 200 KCS.
8. Set range switch to X 10K and adjust C105 for 2 MCS. (Use minimum C possible.)
9. Adjust C111 for most nearly constant amplitude response on X 10K range (make this adjustment with cable attached and a VTVM load not greater than 1 mmf.)
10. Adjust R105 for minimum intermodulation distortion from 58-62 CPS.

ECO	ISSUE	DATE	APPROVED
1	E	11-17-54	T.B.Q.
	D	9-31-54	T.B.Q.
			T.B.Q.



NOTES: UNLESS OTHERWISE SPECIFIED.
 1. RESISTANCE IN OHMS. RESISTORS $\frac{1}{2}$ WATT.
 2. CAPACITANCE VALUES ONE AND OVER IN MICRO-MICROFARADS, LESS THAN ONE IN MICROFARADS.

DONNER SCIENTIFIC CO.		APPROVED BY	SCALE:	DRAWN BY
		T.B.Q.	7-23-54	CUT
MODEL 10		REVIEWED		
SCHEMATIC - LABORATORY		DRAWING NUMBER		
10B12		E		

18.120V 6W



